

Fire Fighting Foam Coalition Meeting

28 September 2001 9:00-11:00

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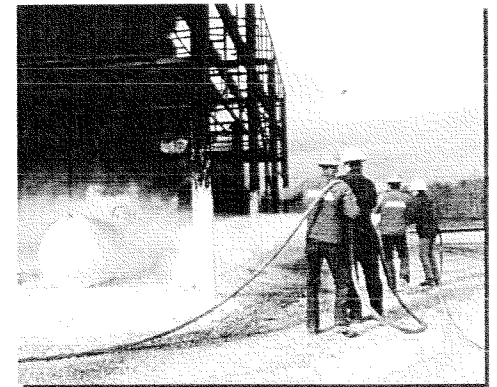
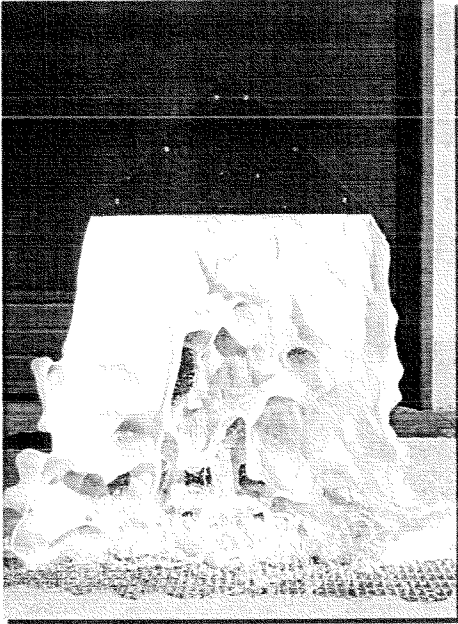
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AFFF Fire Fighting Foams

***EPA Meeting
September 28, 2001***



What is AFFF?

- Highly efficient Aqueous Film Forming Foam used to control and extinguish flammable liquid (Class B) fires and spills
- Two (2) distinct types
 - Standard AFFF for hydrocarbon fires, forms a vapor suppressing aqueous film on most hydrocarbon fuel surfaces
 - Alcohol Resistant (AR) AFFF for polar solvent (alcohol) fires, forms unique polymeric film on polar solvent fuel surfaces

What is AFFF?

DEFINITIONS:

- **Burnback Resistance:**

The ability of the finished foam to resist direct flame impingement in the event the fire were only partially extinguished

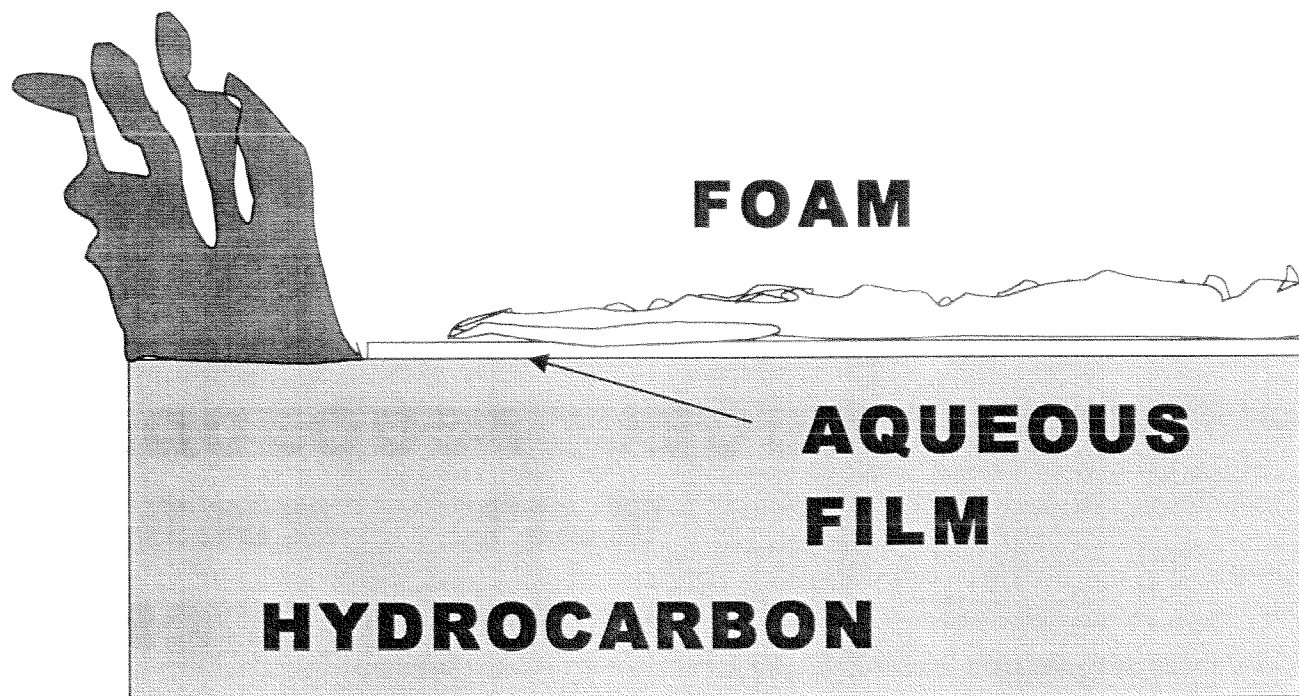
- **Knockdown:**

The ability of the finished foam to quickly reduce the surface area and radiant heat generated by the fire

- **Securing:**

The ability of the finished foam to provide a physical vapor barrier on the fuel surface

What is AFFF?



What is AFFF?

- Specialty blend of fluorochemical and hydrocarbon surfactants with water to form a fire fighting foam concentrate
- Developed early '60's by NRL (Naval Research Laboratory) for aircraft crash fire rescue scenarios, replaced protein-based foams
- Compatible with purple "K" dry chemical for twin agent crash fire rescue operations
- Spreads very quickly across the fuel surface and around obstructions to effect extinguishment

What is AFFF?

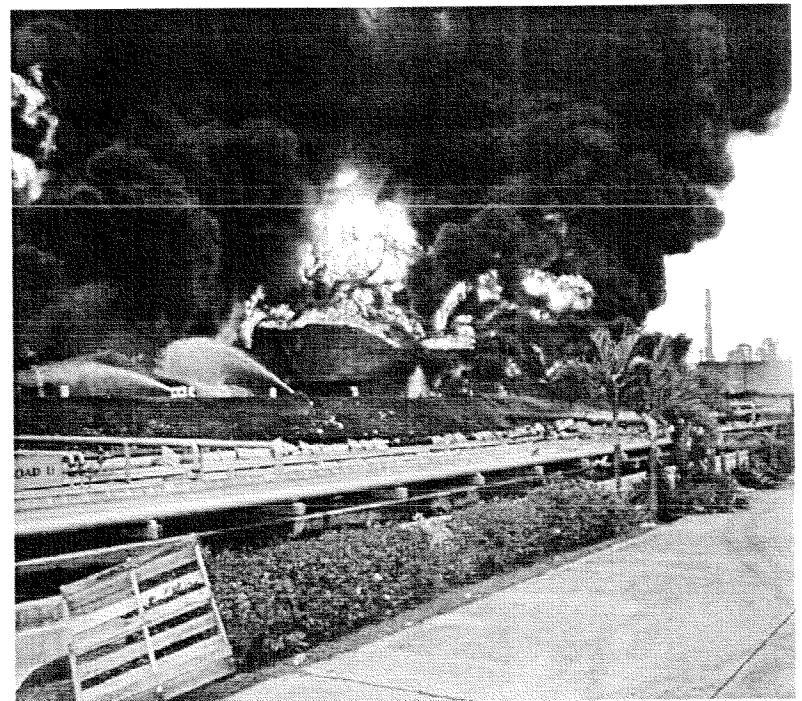
- Very forgiving agent, easy to use and compatible with most discharge devices available for foam application
- Provides significantly higher level of fire suppression capability than any other foam agent currently available
- Responsible for saving numerous lives and billions of dollars worth of plant and equipment over the past 40 years

What is AFFF?



Why Is AFFF Needed?

- Protection of Life and Property
- Protection of the Environment
- Safety of Firefighters
- Most Efficient Agent Known to Successfully and Economically Suppress Large Flammable Liquid Fires



Why Is AFFF Needed?

- Other foam concentrates (non-fluorinated) are less effective and require higher application rates
- Reduced risk to firefighters
- Reduced property damage due to shorter extinguishment times
- Reduced environmental impact from fire and smoke

Why Is AFFF Needed?

- In disaster scenarios use of AFFF can change “recovery” to “rescue”
- Many tank fires would not have been extinguished without AFFF

Why Is AFFF Needed?

- Incorporated in design specifications for aircraft and military equipment
- Required to meet Underwriters Laboratories (UL) and National Fire Protection Association (NFPA) standards
- Essential for insurance coverage of certain facilities

AFFF Market

- Estimated total global sales of all foam agents is \$150-200 million
- U.S. sales estimated at 30% of global market
- About 70% of global foam sales are AFFF
- Historically, about 40% of global AFFF sales were PFOS-based and about 60% telomer-based
- U.S. Telomer-based AFFF Manufacturers:
 - Kidde
 - Ansul
 - Chemguard
 - Buckeye
 - U.S. Foam

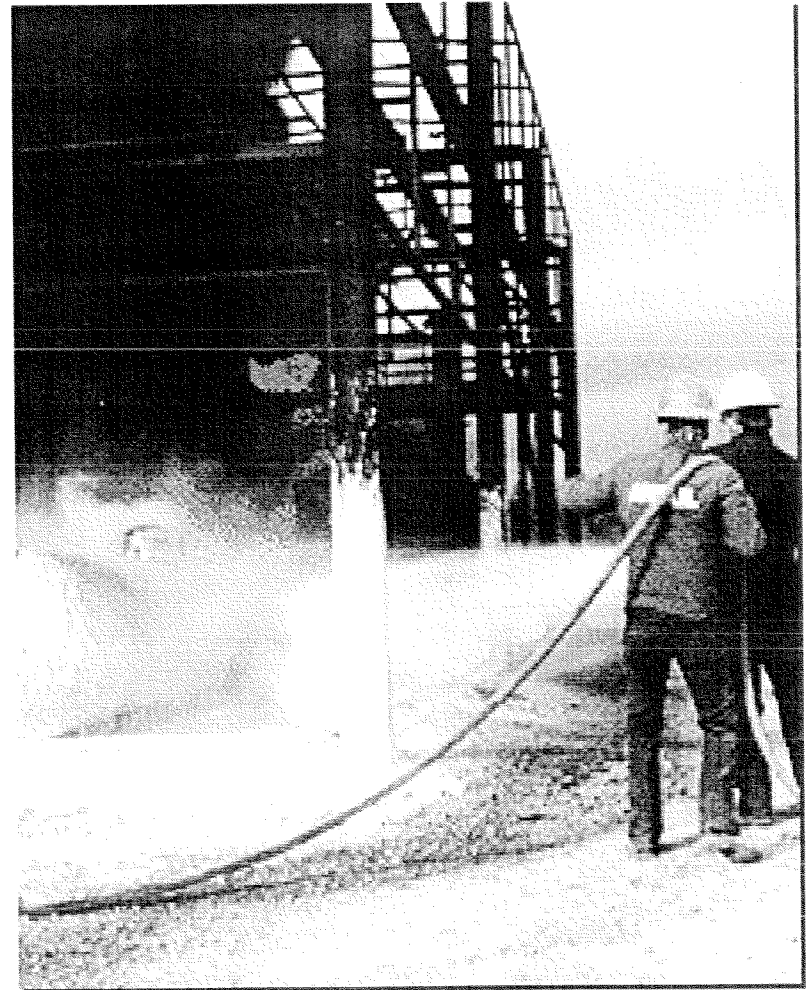
AFFF Market Segments

- Aircraft Rescue Fire Fighting (ARFF)
- Municipal
 - Fire Departments
 - Fire Brigades
- Industrial Fixed Systems - Insurance Driven Market Follows NFPA Guidelines
 - Aircraft Hangars
 - Warehouse Storage
 - Process Equipment Protection
 - Loading Racks
 - Storage Tank Protection



AFFF Market Segments

- **Government**
 - Building Protection Services
 - Armed Forces
- **Marine**
 - Oil Platforms
 - Ships
- **Petro-Chemical**
 - Emergency Response
 - Preparation/Protection Against Catastrophic Fires
- **Many Small Businesses Depend on AFFF**



AFFF Market Segments

- AFFF is not used for:
 - Restaurants
 - Office Buildings
 - Single and Multiple Dwelling Units
 - Computer Rooms
 - Telecommunications

AFFF Market Segments

- Military - 25%
 - Refinery/Petrochemical - 25%
 - Aviation - 22%
 - Municipal - 10%
 - Chemical/Large Industry - 10%
 - Commercial/Small Industry - 10%
- (some overlap between military and aviation)

AFFF Product Mix

- Conventional AFFF Available In 6%, 3%, and 1% Formulations
- Military Specification Products Offered in 3% and 6% Formulations

A Recent Tank Fire

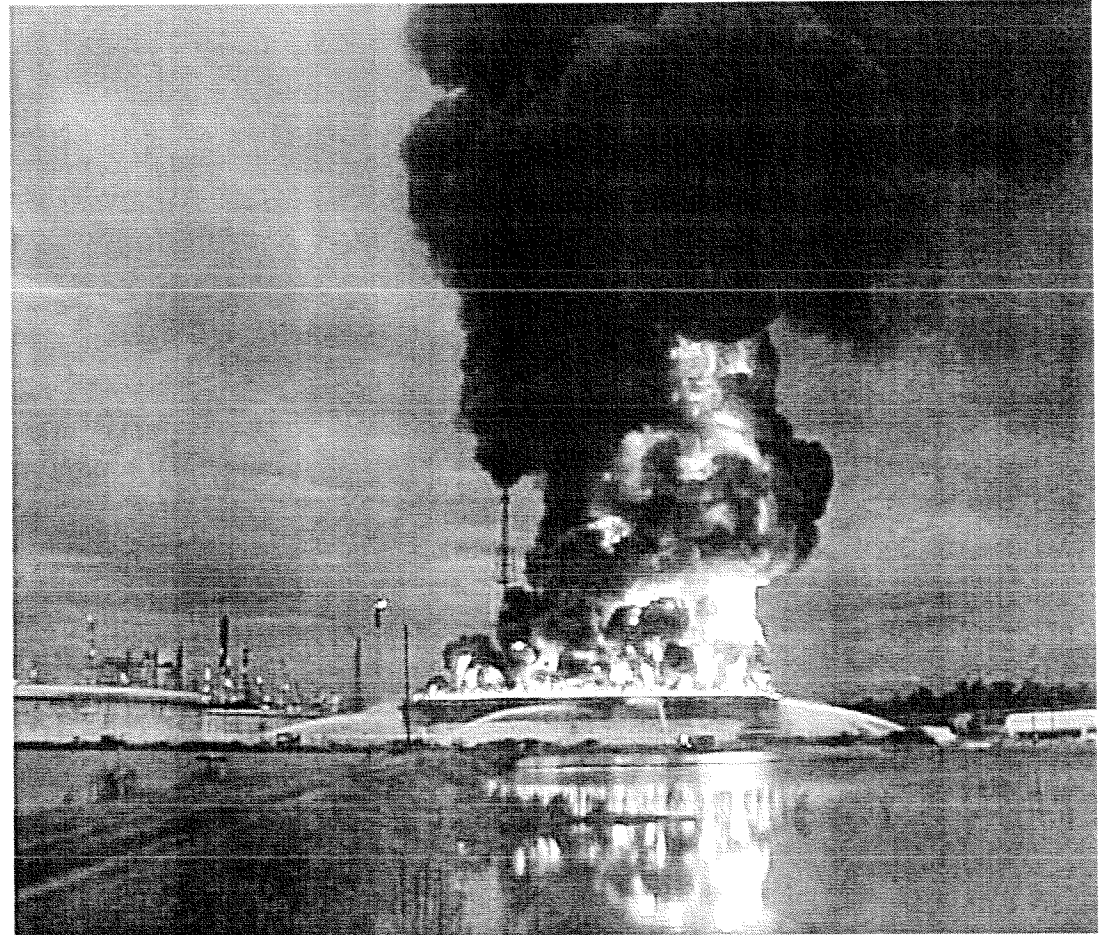
Tank Dimensions – 270 Feet by 32 Feet

Refined Gasoline

Lightning Strike

Extinguished in About
One Hour

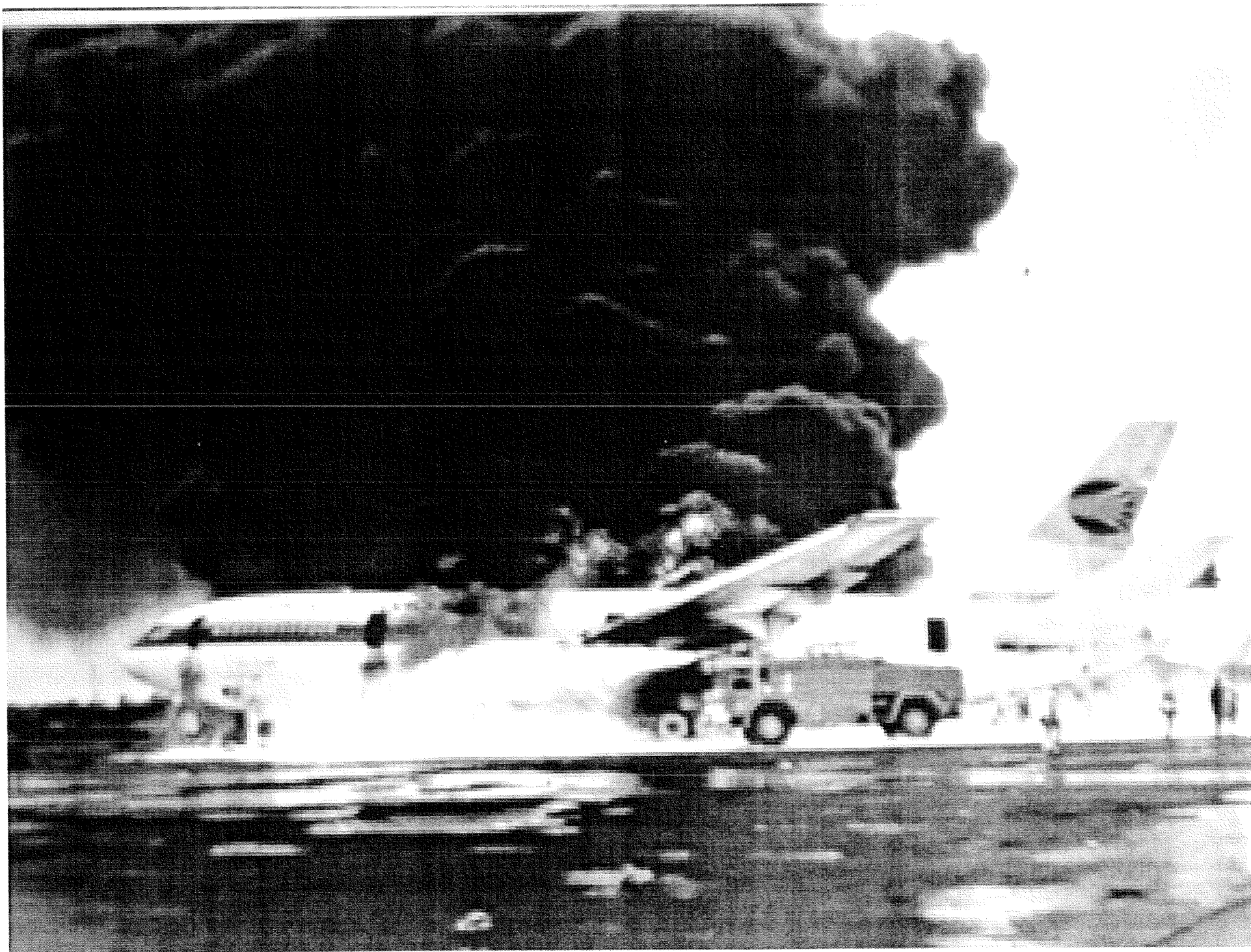
6,000,000 Gallons
Product Saved



Aircraft Accident

- Los Angeles International Airport
- DC 10 Crashed on Runway
- Rapid Intervention and Suppression with AFFF
- About 180 Lives Saved





Composition Of AFFF

Conventional AFFF

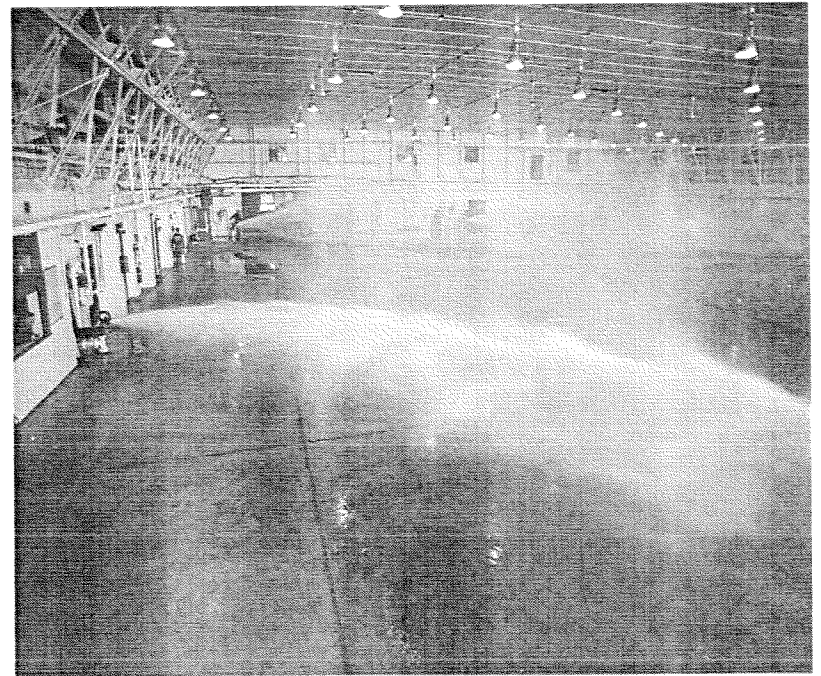
- Fluorinated Surfactants
- Hydrocarbon Surfactants
- Organic Solvents
- Water
- Minor Ingredients Include:
 - Corrosion Inhibitors
 - Inorganic Salts



Composition Of AR-AFFF

Alcohol Resistant AFFF

- Fluorinated Surfactants
- Hydrocarbon Surfactants
- Organic Solvents
- Polymer (Polysaccharide)
- Water
- Minor Ingredients Include:
 - Corrosion Inhibitors
 - Inorganic Salts
 - Biocide



Fluorinated Surfactants

- Fluorinated surfactants are a key ingredient:
 - no other class of surfactants can provide the required low surface tension (15 to 17 dynes/cm)
 - fluorinated surfactants provide positive spreading coefficient and enable film formation on top of lighter fuels

A Little Goes A Long Way

- **Fluorinated Surfactant Content in 3% AFFF**
1000 gallons (8,345 lbs) of AFFF solution
 - = 30 gallons (250 lbs) of 3% AFFF concentrate
 - = 2 lbs of telomer-derived FC-surfactant
 - = 1 lb of fluorine
 - = 0.0012% fluorine in AFFF agent solution

Note: Calculations based on a 3% agent meeting UL 162 specifications.

Environmental Trends

- Telomer-based AFFF contains 50-60% less fluorine than PFOS-based AFFF
- Telomer-based AFFF does not contain PFOS and cannot be oxidized or metabolized into PFOS
- Telomer-based AFFF does not contain any PFOA-based products

AFFF Manufacturers

- What are AFFF manufacturers doing to address the environmental concerns about AFFF?
 - AFFF manufacturers, in conjunction with fluorosurfactant manufacturers and telomer producers, have formed the Fire Fighting Foam Coalition, Inc. (FFFC)
 - Current members are: Ansul, Atofina, Buckeye, Chemguard, Dynax, DuPont, Kidde

Fire Fighting Foam Coalition

- FFFC was formed to represent the AFFF industry's interests on issues related to the environmental acceptability of fire fighting foams
- The coalition provides a focal point for industry science reviews, development of industry positions, and interactions with the EPA and other relevant organizations

Fire Fighting Foam Coalition

FFFC will:

- Support users of AFFF by serving as a single source for accurate, balanced information on environment related questions
- Establish a dialog with EPA and other regulatory authorities to ensure that accurate information about PFOS alternatives, including telomer-based products, is disseminated into the marketplace

Fire Fighting Foam Coalition

FFFC will:

- Participate in EPA's ongoing review of PFOA and telomers as they relate to AFFF
- Continue a dialog with DoD to ensure that the differences between AFFF agents are well understood
- Serve as a focal point for information on the development and approval of environmentally acceptable and effective alternatives

Managing The Use Of AFFF

- Use Alternative Training Foam Agents
- Use Alternative Testing Foam Agents
- Minimize Discharges

FFFC Position On AFFF

- **AFFF Has A Proven Track-Record of Superior Performance on Class B Fires**
 - Lower Critical Application Rate
 - Faster Knockdown
 - Superior Burnback Resistance
- **There Is Not An Effective Current Replacement for AFFF**
- **FFFC Members Are Committed to the Future Development and Manufacturing of Effective Foam Products**

FFFC Position On AFFF

- AFFF and fluorochemical manufacturers are committed to working with EPA through FFFC to develop voluntary programs that minimize the potential environmental impacts of AFFF
- AFFF and fluorochemical manufacturers will continue to search for improved fire fighting foams